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PACIFIC TELESIS
Group-Washington

August 9, 1996

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, NW, Room 222
Washington, DC 20554

Dear Mr. Caton:

Re: *CC Docket No. 96-45, Federal-State Joint Board on Universal Service*

On behalf of Pacific Telesis Group, please find enclosed an original and six copies of its *"Further Comments on Cost Proxy Models"* in the above proceeding.

Please stamp and return the provided copy to confirm your receipt. Please contact me should you have any questions or require additional information concerning this matter.

Sincerely,

Enclosure

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Federal-State Joint Board on Universal Service	CC Docket No. 96-45

FURTHER COMMENTS OF PACIFIC TELESIS GROUP ON COST PROXY MODELS

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Date: August 9, 1996

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Summary

Pacific believes the subsidy required for the recovery of the costs incurred in providing universal service must be calculated properly and made explicit and available to any qualified universal service provider through a competitively neutral funding mechanism. These are the necessary steps to ensure that local exchange competition benefits all areas of the country and universal service survives in a competitive environment. The first step in this process is to establish the costs of providing universal service, accurately and completely.

In order to address properly the crucial question of the size of the subsidy, the Commission must have the best data available. While there is no consensus among the parties as to whether a proxy cost model or actual, embedded costs should be used to establish universal service costs, we support the use of a proxy model for several reasons. A proxy model uses objective factors (e.g., loop length, population density, terrain, technology mix) that are the actual key determinants of the cost of providing universal service in a given geographical area. Unlike an embedded cost analysis, a proxy model can simulate the actual costs of providing universal service on a highly disaggregated basis. This is an important attribute because it permits more precise estimates and accurate pinpointing of high cost areas.

Pacific's Cost Proxy Model (CPM) is the only model submitted which employs a bottom's up methodology dividing up the costs of providing service into discrete, small components. Handling costs in this discrete fashion allows flexibility in determining what services should be included in the core services to be provided and in targeting high cost areas.

The most important determinant in choosing a proxy model is not the model itself -- it is in the accuracy of determining the cost of providing Universal Service predicted by the model. The model must predict costs which reflect the actual costs of providing service in a given geography. If a model predicts a subsidy which is too small, competition will not develop in certain areas because the cost to serve the area will exceed the revenue.

For a model to predict the accurate cost of providing service, it must (1) estimate all of the costs of providing universal service, accurately and completely, (2) estimate costs on a highly disaggregated basis, and (3) be flexible and verifiable.

The CPM has been designed with a "bottoms up methodology" to determine costs by separating the costs of providing service into small components. This ensures that all costs have been accounted for and permits flexibility in combining components services which are part of the universal services which are part of the universal service definition.

The CPM also use a highly disaggregated geographic area, a "grid". A grid is 1/100 of a degree of longitude and latitude (approximately 3000 ft. x 3000 ft.). By predicting costs to such a specific area, high cost areas can be accurately targeted. Wire centers can provide too wide an area and result in averaging of costs such that subsidy amounts will not accurately reflect the cost of service.

The Hatfield model (HM) is woefully inadequate in predicting costs in any network. Instead of examining costs actually incurred the HM relies on a series of factors derived from embedded investments, and applies them against forward looking costs. Thus the model predicts that, for example, our maintenance prices will fall if an equipment vendor lowers its price. The HM also consistently understates loop and switching costs and wrongly extrapolates non-representative, state-specific cost studies to the entire nation.

The CPM is an "open" model in which all inputs can be changed to reflect actual costs, average costs or any combination. The HM, on the other hand, has been designed with many portions "locked" and therefore unavailable for viewing or adjusting.

For all of these reasons, and reasons set out below, and in the attachments to these Further Comments, we believe Pacific's CPM is the most accurate proxy model that can be used to predict costs of a highly disaggregated basis.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Federal-State Joint Board on Universal Service	CC Docket No. 96-45

FURTHER COMMENTS OF PACIFIC TELESIS GROUP ON COST PROXY MODELS

Pacific Telesis Group files these comments in response to the Commission's Public Notice seeking comments on the proxy models submitted in the above-captioned docket.

Pacific Bell is the sponsor of the Cost Proxy Model, a proxy model we designed in conjunction with INDETEC International. Our comments will center on why the Cost Proxy Model is an appropriate model to use for valuing subsidy dollars in discrete geographic units. In addition, we will comment on why the Hatfield Model is ill-suited to predict costs in local exchange networks. We will also comment briefly on the BCM-2, recently released by USWest and Sprint.

I. INTRODUCTION

One of the central debates in these universal service proceedings is whether a subsidy exists and if so, to what extent. This is a crucial question to address properly because of the enormity of what is at stake. Some parties will advocate that there is no subsidy or that the number is close to zero. Other parties will claim that while subsidies may exist, current funding mechanisms (e.g., overpriced LEC toll services, mandatory price averaging of basic exchange service) are more than sufficient to preserve universal service well into the future competitive environment. Ironically, these parties will also argue that the subsidy they pay, through access charges, for example, should be lowered significantly or eliminated altogether.

Many parties have suggested the use of economic models to predict the costs of serving customers to promote universal telephone service. A universal service fund has two fundamental purposes; to permit a carrier to recover its costs of serving an area, and in the process, to promote competition. Determining how much it costs to serve an area is no easy task. Loop costs vary greatly with geography and therefore any costs calculated must take into account small geographic areas. However, LECs, particularly large LECs, do not account for their costs geographically. Thus some method must be used to disaggregate costs into a small geography.

Also, as markets are opening to competition, service providers will be competing with one another for subscribers. Modeling the cost of building today's

network permits each carrier to fairly compete for the subsidy dollars and for the subscriber.

Disaggregation of costs could increase the administrative burden on the universal service fund. A proxy model simplifies administration in that once an appropriate model is developed, and the appropriate inputs are agreed to, the model runs in the same way for each carrier or class of carrier.

The most important factor for the Commission to consider is that the universal service fund must be sized accurately in order to carry out the Congressional intent to create a procompetitive environment. If the fund is sized too small, competition will not develop since service providers will not venture into areas where they cannot cover their costs of service. With a fund that is too small, cream-skimming, where providers target competition only in those areas where revenue potential is high and costs are low (such as dense urban areas), will continue and true competition will not develop elsewhere. A proxy model must be adopted which permits the fund to be large enough to promote true competition.

The best way to ensure that a proxy model yields an accurate result is to utilize a proxy model which accurately predicts the cost of a network. We will briefly describe the models under consideration.

A. Pacific's Cost Proxy Model

The Cost Proxy Model (CPM) has been developed to prepare telecommunications companies and regulators for the impending changes in

universal service funding by improving the quality and quantity of information available to make and support universal service and related policy decisions. By integrating financial, engineering, economic and managerial accounting principles, the CPM provides the costs, revenues and resulting subsidy of providing universal service today. The CPM aggregates the diverse costs of serving customers in different locations under different circumstances while retaining adherence to standard economic and engineering principles. The CPM is also an engineering model developed by experienced telephone network engineers. And, last but not least, the CPM is an open, and accessible tool that can accommodate conditions and requirements unique to a particular geography or state. A more complete description and economic justification for the design of the Cost Proxy Model is contained in Appendix A, Declaration of Richard Emmerson.

A proposed decision by the Administrative Law Judge in California on universal service adopted the Cost Proxy Model as the "more appropriate model [compared to Hatfield] for estimating the cost of providing basic service in California."[1] The proposed decision concludes "The CPM should be adopted as the proxy model to develop the cost of providing basic service to all residential customers in California."[2]

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[1] Re: Universal Service, R.95-01-020, Proposed Decision, mailed 8/5/96, p. 109. Pacific has serious concerns with many of the recommendations in the ALJ's proposed decision, not the least of which is the grossly undersized universal service fund.

[2] Id. at p. 244.

B. The Hatfield Model (Including The Benchmark Cost Model-1 Modules)

The BCM-1 is not a valid tool for subsidy determination in this docket. In 1995 when it was released, the Joint Sponsors stated "The BCM does not define the actual cost of any telephone company, nor the embedded cost that a company might experience in providing telephone service today. Rather, the BCM provides a benchmark measurement of the relative costs of serving customer residing in given areas, i.e., the CBGs."[3]

After the release of BCM-2 this past July, the original BCM no longer is sponsored by any party. Of the original sponsors of BCM-1, USWest and Sprint have endorsed BCM-2, while MCI has thrown its support with Hatfield, version 2.2. Thus BCM-1 should no longer be considered as a viable model.

However, remnants of BCM-1 are contained as modules in the Hatfield model. Therefore, as we discuss the Hatfield model,[4] we will address those parts of BCM-1 that are inputs in that model. As we discuss below, the Hatfield model does not meet the criteria for an accurate proxy model.

C. BCM-2

The BCM-1 model was designed to "identify high cost CBGs for which explicit support might be required." Little attention was initially paid to precise

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[3] BCM Documentation, September 12, 1995, pages 2-3.

[4] Attached as Appendix B is an in depth analysis of the Hatfield model and its shortcomings.

cost structure or urban CBGs. The BCM-2 has been developed to expand the capabilities of the original model, and corrects many of the shortcomings of the original BCM-1. We are still analyzing the BCM-2.

While differences remain between the CPM and BCM-2, the models are producing very similar results for California. The CPM yielded a total loop cost of $2.9B, while the BCM-2's prediction was $2.6B. We are hopeful that we can combine the two models in the informal work currently ongoing.

D. Comparison Of Models

The attached Declaration of Rick Emmerson sets out a methodological comparison of the four Models.

II. EVALUATING COMPETING MODELS

Each of the models submitted in this proceeding contain a plethora of assumptions, inputs and algorithms which may or may not make sense to the untrained eye. While it is not necessary to have an engineering degree or a degree in economics to examine the merits of each of the models, it is important to focus on those attributes that are the key determinants of the accurate and complete costs to provide universal service today.

A. A Model Should Estimate All Of The Costs Of Providing Universal Service, Accurately And Completely

The network today has been designed to permit universal service obligations to be met in the most efficient manner possible. The network has been built with the capacity to be ready-to-serve, on demand, to any and all customers that request basic telephone service anywhere in the serving territory of the universal service provider. New entrants who choose to become universal service providers will have the same obligations for the geographic areas they serve and unless the universal service obligation is revised, will incur similar expenses. If a proxy cost model were to exclude certain costs (e.g., additional lines, rearrangement expenses, shared and common costs) or include incorrect assumptions or inputs that deflate actual universal service costs, then the fund would be undersized. Thus, a model should include all costs to the provider of serving the area.

An undersized fund will discourage competition (and investments) from entering areas of high cost and low revenues, resulting in the benefits of competition reaching some basic service customers but not others. Infrastructure development will be discouraged as well in areas where funding is too low since companies will not invest in facilities from which they can not expect to realize a profit. Conversely, an oversized fund presents similar problems with respect to competition or investments. While competitors will ignore areas that are under funded, they will overbuild in areas that are over funded. Consumers will be worse

off since they must ultimately bear the additional cost of inefficient competition and investments.

1. The Cost Proxy Model Includes All Costs Of Providing Basic Service

If universal service is adequately funded, then carriers will be attracted to serve any high cost area. In order for a proxy model to accurately reflect the cost of providing universal service on a forward-looking basis, it must have the best and most accurate information input into it. The CPM uses relevant inputs to ensure that the costs predicted by the CPM are appropriate and complete.

The CPM uses actual prices paid for switching equipment and properly reflects the long run incremental analysis of switch prices, taking into account actual variability in prices over time.[5] The CPM could also use default parameters based on Pacific's costs.

The CPM properly uses actual utilization levels or fill factors rather than objective fill factors because this is how an actual network is built. Actual fill factors reflect capacity allowances for maintenance and repair consistent with the service standards expected of the universal service provider. If the CPM were to incorporate unrealistic, objective fill factors that are higher than actual levels, the

[5] The CPM is currently loaded with Pacific's incremental costs, some of which are a product of models such as SCIS. Because the CPM is flexible, parties are not forced to use Pacific's inputs; the model can easily be loaded with any other inputs. We have used the inputs that most accurately reflect our costs.

result would be very costly additions or reinforcements at an earlier date than anticipated.

The state of engineering economics has evolved over the last decade toward cost studies which justify lower fill factors. It is less expensive to put additional cables into the ground or on poles at the first installation than it is to put just enough cables in one year and then reinforce at regular intervals. By using actual fill factors, the CPM ensures that the costs predicted are appropriate, accurate and lower cost in the long run.

The CPM develops costs of the loop, which is the essential element of any basic service package. The CPM also estimates the fixed cost of access to a switch (for dialtone) and the basic local network (for local calling). There are other real and legitimate costs associated with the provision of universal service which the CPM incorporates. Additional costs incurred for such items as billing, billing inquires and bill collection are part of the cash operating expenses attributable to universal service. Finally, the CPM or any model would be incomplete -- and the universal service fund would be undersized -- if a reasonable portion of a company's joint and common costs were not included.

2. <u>The Hatfield Model (Including BCM-1 Modules) Does Not Include All Costs Of The Network</u>

The Hatfield model is incomplete -- it uses factors, rather than actual costs, to calculate total loop costs. The model also appears to have omitted certain cost associated with the loop, such as engineering and cable splicing costs. The

model estimates the cost of cable materials and then takes the estimated cost and applies a (proprietary) factor (or multiplier) to attempt to estimate total loop costs including structures (poles and conduits), engineering and installation. Since cable materials account for only about 20% of total loop investment, the derived cable multiplier (however it is derived) accounts for the other 80%. Using a factor that is derived from actual costs representing only 20% of total costs to estimate all other costs can not be expected to produce reliable results.

The Hatfield model understates switch investment and switching costs. The model understates digital switch investment by using only current prices, which are at their lowest in terms of the present life cycle stage of digital switch technology. In addition, the Hatfield model uses switching data from a New Hampshire study to develop a switch maintenance "factor" for estimating costs. Though the factor reflects the fact that New Hampshire is a state with many small towns, the Hatfield Model nevertheless applies this factor on a wholesale basis across all of California and the United States despite the very different geographical and demographic characteristics of California and other states.

The Hatfield Model also does not model the way distribution plant is actually engineered and placed today. The model assumes that the distribution service area is square, that the population within the square is evenly distributed and that this imaginary square area can be served by four cable runs that each

measure three-fourths the length of the sides of the square. This is not how distribution plant is placed.[6]

The Hatfield Model assumes unreasonably long economic lives for investment. The model uses an eighteen year service life on average for investments. The lower the depreciation rate, the more the investment exceeds its economic life. An eighteen year service life is much longer than the FCC prescribed rate and results in a much lower depreciation expense rate. The long depreciation lives reflected in the Hatfield Model are not appropriate for use in a proxy model that is based on total service long run incremental costs (TSLRIC) for the following reason. The Hatfield Model's depreciation lives reflect historical plant placements and fail to reflect the forward-looking, long run view of competition and its full effects. Any proxy model intended to encourage efficient competition should reflect economic lives consistent with fully competitive markets. The Hatfield model fails to do this. As an example, AT&T's 1994 ARMIS reports show a competitive depreciation life of 9.2 years, or a 10.9% depreciation rate, which contrasts starkly with the Hatfield model's life of 18 years or 5.5%.

B. A Model Should Estimate Costs On A Highly Disaggregated Basis

The size of the geographic unit for which the model can estimate cost and subsidy is important. A model that can deaverage the subsidy to a greater extent is more advantageous because it will permit more precise estimates and

[6] See Appendix B for a complete explanation.

more accurate targeting of subsidy to high cost areas where subsidy is needed the most. Today, we base our pricing on costs that are averaged across very large geographic units (i.e., the entire state). Areas that have enormous differences in costs are averaged together. In a competitive environment, averaging to this extent will encourage competitors to serve only customers in low cost areas, while high cost areas will be underserved. The benefits of competition will reach some basic service customers but not others.

1. The Cost Proxy Model Finely Targets The Subsidy

Generally, the more discrete the geographic unit, the more accurate the subsidy will be. The CPM uses a grid cell structure (1/100 of a degree of latitude and 1/100 of a degree of longitude) and targets costs to that small geography. This permits better targeting of the subsidy in areas (especially rural areas) where census block groups (CBGs) cover very large areas. Because the grid cell structure is a much finer level of geographic detail than the CBG, wirecenter, or study area, it allows a much finer geographic cost deaveraging and eliminates cost averaging problems that would otherwise occur in much larger geographic units.

The grid cell structure used in the CPM also improves accuracy in two respects. By splitting the country into 1/100 of degree of latitude and longitude (or approximately 3000 ft. by 3000 ft. cells), the CPM is precise enough to accurately capture distances and serving wire centers. In addition, the use of a grid cell structure along with wire center boundaries (available from commercial databases)

minimizes the problem of misassigning customers to the wrong wire center and ultimately to the wrong company. As long as there is grid information available,[7] all of the wire centers in the commercial databases will be represented in the CPM results. Using the basic geographic unit of the grid, the CPM provides greater accuracy and deaveraged cost than either the census block group (CBG) or wire center.

The recent proposed decision by the California Public Utilities Commission stated that the "CPM's grid cell design is more conducive to an accurate representation of costs than the HPM's [Hatfield] design."[8] The grid design also allows for a flexible analysis based on CBG, wire center, study area, or state.

2. The Hatfield Model (Including BCM-1 Modules) Uses CBGs Which May Result In Too Much Averaging Of Costs

While the CBG may be the appropriate geographic unit for purposes of administering the fund, it should not be assigned to density zones for purposes of measuring the funding requirement. The latter is what the Hatfield Model does. The model groups CBGs by density zones based on different levels of households per square mile. This approach leads to the same averaging concerns that initially led to the development of finer geographic units. That is, within any density zone,

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[7] Grid information is available from various commercial vendors for all 50 states.

[8] Re: Universal Service, R.95-01-020, Proposed Decision, mailed 8/5/96, p. 110.

there will be CBGs that have high subsidy needs as well as some CBGs with low subsidy needs. The reason this occurs is that the primary determinant of cost is distance (e.g., loop length), not density. Overall, smaller geographic units are more advantageous because they allow more accurate sizing and pinpointing of the subsidy to areas most in need. For example, in one wire center in the city of San Francisco, SNFCCA14, there are 14 CBGs where density is constant but where the cost varies from $17.55 to $27.20 due to loop length differences.

C. A Model Should Be Flexible And Verifiable

As technology, customer demand and public policy evolve over time, a proxy cost model should be flexible enough to accommodate changes which affect the overall cost of providing universal service. For example, a model should accommodate changes to the definition of universal service. Each state should be free to require carriers to provide different core services. For example, some states may not require local usage while other states, such as California, may require the inclusion of local usage as part of the definition of universal service. Over time, the services to be included in universal service may change. A proxy cost model should be flexible enough to accommodate those changes in order to ensure accurate and complete funding of universal service.

A model should be verifiable. Regulators must be assured that true costs are being identified by the proxy cost model to be used. A model's design, operational parameters and inputs should be reasonably and easily audible.

1. The Cost Proxy Model Has Been Designed To Be Extremely Flexible And Is Fully Verifiable

Flexibility to handle changes in definitions or requirements is key as the market changes. The CPM can easily accommodate changes in the definition of universal service or to any other aspect of the provision of basic residential service. Several methodological approaches incorporated in the CPM allow for this flexibility. The model incorporates a "bottoms-up" approach to cost by separating costs of providing service into small components. This approach provides not only a solid base for more accurate cost estimates at the component level, but also allows more flexibility of aggregation to service levels or with any combination of components. The CPM also separates operating expenses from investment unlike other models where operating expenses are driven by investment. Operating expenses in the CPM are developed by cost causation principles, leading to more accurate and realistic expense estimates. The CPM also uses a flexible, table driven database. These approaches and the table design of the CPM provide users of the model with the flexibility to accommodate changes in the definition of universal service or differences in the definition from state to state.

The CPM also provides flexibility by using a grid cell structure that can be aggregated to a CBG, were center, company, county, state or study area basis.

From our experience in California, we have found in the ARMIS reports that tremendous variation exists in individual companies' cost structures.

These variations appear to be related to the line size of the companies -- smaller companies may have higher fixed costs and lower equipment purchasing power. The CPM can flexibly accommodate these differences into its results. In addition, because the inputs to the CPM are adjustable, any user of the model can modify the cost inputs to reflect their own appropriate cost assumptions and their own particular cost structure.

All of the information in the CPM can be, and has been, made available to the Commission and to other parties for their review and verification. The back up material underlying Pacific's inputs (such as fill factors, and engineering assumptions) is also available. The individual cost data upon which input factors are based is also available upon execution of a nondisclosure agreement so that sensitive cost data cannot be used for an improper purpose (e.g., marketing) by the reviewer. As long as some way exists to protect proprietary cost information, but still make it readily available for review and verification as we have done with the CPM, then the concern that a model that contains proprietary information is not verifiable can be easily dismissed. The Commission should not dismiss a model that contains some proprietary information for two important reasons. The proprietary information may be the most relevant cost information that exists and the proprietary information may give rise to the most accurate proxy costs.

2. The Hatfield Model (Including BCM-1 Modules) Is Not Open Or Accessible

Many portions of the Hatfield Model are "locked" and therefore cannot be viewed or adjusted. For example, the cable multiplier used to estimate 80% of loop investment is a locked item. Many of the algorithms and engineering rules are hard coded into the software. Like the locked items, this means that they cannot be viewed or adjusted. It does not appear, given the many parts of the model that cannot be viewed, that the model lends itself to being reasonably verifiable.

The proposed decision in California found that "the HPM relies on: (1) assumptions in the BCM which AT&T/MCI cannot alter or explain; (2) unnamed experts; and (3) selected portions of cost studies from other jurisdictions.[9]

III. CONCLUSION

The Cost Proxy Model should be adopted for use in predicting costs, and therefore subsidy for universal service purposes. It will more accurately estimate the costs of providing service on a deaveraged basis and is more flexible and verifiable. The Hatfield model does not meet these standards. Instead it is based on factors that are not easily extrapolated nor verified.

[9] Re: Universal Service, R.95-01-020, Proposed Decision, mailed 8/5/96, p. 230.

We continue to be willing to answer any questions or concerns regarding its the Cost Proxy Model and we will be happy to demonstrate to any interested party what we believe is its superior ability to predict costs.

Respectfully submitted,

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Date: August 9, 1996
0142498.01

APPENDIX A

DECLARATION OF DR. RICHARD D. EMMERSON

My name is Richard D. Emmerson, Ph.D. and I declare as follows.

I am the President and CEO of INDETEC International, Inc. I am filing this affidavit on behalf of Pacific Bell (the "Company"). My business address is 341 La Amatista, Del Mar, CA 92014. I have a Ph.D. in economics from the University of California at Santa Barbara. During the past 20 years, I have taught in the Department of Economics at the University of California, San Diego, and I have consulted, testified, and taught courses on economic issues in telecommunications. Much of my consulting and teaching is about incremental cost study methodologies. My staff and I have conducted over one hundred projects involving incremental costs in telecommunications.

I am submitting this affidavit in response to the Commission's request for further comments on cost models.

I. Key Characteristics To Be Considered In The Development Of Cost Proxy Models For Determining Universal Service Subsidy Levels.

A. Development of Base Geographic Information

The primary driver of loop investment is distance and a secondary driver is density as determined by the geographic clustering of end users. Since both of these are related to the location of customers within a specific area, the method chosen for representing information on a geographic basis is a crucial determinant of the reliability of the answers generated; the more accurate are the represented customer locations, the more realistic will be the model results. The ideal unit of geography is either individual customers[1] or a small, uniform size area that captures the dispersion of population,

[1] None of the models reviewed and evaluated here uses the location of individual customers; only the cost proxy model is capable of doing so (an early version of the Cost Proxy Model was implemented in